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TRANSLATIONS ON EASTERN EUROPE

SCIENTIFIC AFFAIRS

(FOUO 4/79)

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TRANSLATIONS ON EASTERN EUROPE

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(FOUO 4/79)

CONTENTS

CZECHOSLOVAKIA

WORK OF SSR GEODETIC AND CARTOGRAPHIC OFFICE, INSTITUTE REVIEWED

Prague GEODETICKY A KARTOGRAFICKY OBZOR in Czech/Slovak No 2, 1979 pp 33-40

[Article by Engr Ondrej Michalko, chairman, and Engr Daniel Lenko, deputy chairman of the Slovak Geodetic and Cartographic Office: "Twenty-Five Years of Successful Activity by the Centralized Geodetic and Cartographic Service in the Slovak Socialist Republic, a Solid Foundation for the Further Development of the Slovak Geodetic and Cartographic Office"]

[Excerpt] 3. Fulfillment of Tasks Assigned by State Central Agencies

The largest customer for geodetic and cartographic work in our country is the state. Fulfillment of the tasks assigned by state central agencies accounts for more than 50 percent of the volume of work performed by the economic organizations of the SUGK [Slovak Geodetic and Cartographic Office]. Such tasks are ensured in a planned manner, on the basis of a long-range outlook, in accordance with the needs of the most diverse technical undertakings and capital construction, and with the requirements of practically all branches of the national economy.

The Czechoslovak triangulation net, which comprises about 16,000 points, was completed in Slovakia already in 1957. It has a high level in terms of quality and accuracy, and it serves scientific as well as engineering purposes. This net is being maintained systematically at present, and higher-order nets have been or are being developed locally for special investment projects, for example, for the construction of dams on the Danube, for highway, expressway and railway bridges accross the Danube, for areas exposed to landslides such as the Handlova region, etc.

The eastern part of the Czechoslovak vertical control survey net, which has more than 30,000 monumented bench marks, was developed prior to 1960. In 1957-1960, the evalations were recomputed from the Adriatic to the Baltic datum. The levelings that have been rerun since 1961 also serve to research recent motions of the earth's crust, among other localities also along the Bratislava geodynamic polygon, in the Novaky-Handlova-Cigel mining region, on the Danube lowland and elsewhere. The levelings rerun since 1974 have been included in the system of the international program for repeated levelings (Hungary, Poland, the Soviet Union).

The first- and second-order Czechoslovak state gravimetric nets in the 1964 system were developed in 1958-1964. Important in this activity was international cooperation to interconnect the national gravity reference polygons and the gravimetric nets of Hungary and Poland. The same is true of work on the Carpathian polygon to investigate secular changes in gravity. In 1977, within the framework of international cooperation, the Lomnice Peak vertical gravimetric bench mark was developed and measured, and the absolute measurement of gravity was performed at the Zilina gravimetric point. Gravimetry in our country serves primarily scientific purposes, in conjunction with refining and modernizing the astronomic-geodetic net.

We are achieivng significant results in developing state cartographic work, particularly during the past decade. The fiscal nature of the former land cadaster provided an incentive for preparing cadastral maps only of those regions of Slovakia where fertile soil meant high tax revenue for the state treasury. For such regions of Slovakia we have relatively good large-scale maps, although only with planimetric data. But postwar capital construction and planning created a demand for topographic maps. The industrialization of Slovakia, as ordered by the resolutions of party congresses, proceeded very rapidly. The construction of factories, enterprises and power plants was localized in regions suitable from the viewpoint of the influx of manpower, supply of raw materials, and advantageous terrain configurations. But these were mostly localities for which no maps were available at all. Territorial and regional planning developed, and roads, expressways, transmission lines, gas and petroleum pipelines were designed. A derived state map on the scale of 1:5000 was produced in 1950-1957, and its 10,110 sheets covered the entire territory of Slovakia. Despite certain shortcomings stemming from the quality of the data, and from the method and speed of processing, this map is used to a considerable extent even today, mostly in planning.

By its resolution No 43 of 1962, the Czechoslovak government ordered the preparation by 1992 of technical-economic maps on the scales of 1:1000, 1:2000 and 1:5000, with detailed planimetric and relief data. This state cartographic work is continuing essentially also at present, with certain modifications, pursuant to the Slovak government's resolution No 134 of 1971. The large-scale maps are to be completed and revised by 1985, so that the entire territory of Slovakia will be covered with maps that will satisfy the requirements of not only real-estate records but also of every type of technical undertaking. Within the historically short period of three five-year plans it will be necessary to map 20.3 percent of Slovakia's territory, and to revise the maps for 13.4 percent of its territory. The mastering of this exceptionally demanding task requires special organizational measures, the application of new equipment and technology, particularly the wider use of photogrammetry and automation in all organizations of the geodetic and cartographic branch. This at present is the basis of our branch task, fulfillment of which will significantly upgrade real-estate records. However, the various branches' constantly increasing requirements, urgent from the viewpoint of society as a whole, far exceed

the capacities of the SUGK's organizations. Therefore we are grateful for the understanding of the Czech Geodetic and Cartographic Office's management and its organizations which are giving us substantial assistance in mapping the okreses of Central Slovakia Kraj, despite the considerable difficulties in fulfilling their tasks in their own krajs. We regard this as a certain manifestation of international assistance in filling in the collection of maps the gaps that were caused by the preceding generations, particularly by the conditions that existed in former bourgeois Czechoslovakia. Determination to fulfill on schedule such an extensive task within a relatively short time can be expected only of people dedicated to the ideas of socialism, people who document their attitude to social tasks and duties by enormous effort to fulfill the task and to exceed the plan.

Our organizations are exerting equally great effort to fulfill their tasks also in the area of real-estate records. Work here is often hampered by the poor quality of the cartographic data, by the fact that the work performed by the former cadastral survey and the land register was not reconciled, by the use of provisional maps in mountainous and piedmont regions, and by the multitude of changes stemming mostly from capital construction. Not even the preparation of 16,000 to 20,000 cadastral maps a year would be sufficient under these conditions to update all the changes in the real-estate records, especially not when the work is hampered temporarily by the economic and technical rearrangement of the parcels, and compicated by confusion regarding ownership and user rights. Even under these complex conditions, the organizations of our branch are successfully aiding agriculture in establishing the land records of 767 agricultural enterprises, in preparing inventories of the farms' land, in safeguarding the stock of farmland and forests, and also by providing technical assistance to the national committees on questions of reporting changes of the data in the real-estate records. The safeguarding of the stock of farmland in certainly enhancing by reporting to the organs concerned the unauthorized changes in land use (there were 3544 such cases in 1977 alone) or by quickly preparing and issuing extracts from the files of the former cadastral survey regarding the quality of the soil and other data from the real-estate records. Regrettably, fulfillment of the task of clarifying title to land is not proceeding satisfactorily: there are communities where merely 40 to 50 percent of the cases can be clarified to establish title pages. The one million title pages established so far represent only one-half of the total number of title pages anticipated in the Slovak Socialist Republic An improvement of the overall situation can be expected only after the enactment of an amendment to the Law on Real-Estate Records. This amendment is now in the drafting stage.

The cartographic works prepared and published by the Slovak Cartography Enterprise also play a role on the educational, cultural and ideological front of our society's transformation. Since the beginnings of Slovak cartography's development, which date back to the printing of cadastral maps in Turciansky Martin, through the first steps in conjunction with

preparing and publishing topographic maps in the Modra Harmonia, there arose in Bratislava a modern plant for publishing all types of maps and atlases, to systematically supply the schools' and public's demand for atlases of various topical orientation, school wall maps, tourist maps on different scales and varying in their arrangement and content, road maps and road atlases, trail markers and signposts, municipal street maps, political-education maps, as well as for three-dimensional maps and globes. Medium- and small-scale road maps, geological maps, water-conservation maps and maps of Czechoslovakia's administrative subdivision are published in sufficient quantity and variety for the needs of the state organs and socialist organizations; also large-scale maps, primarily for the needs of planning and capital construction.

Slovak cartography in these years is "passing the final examination" of its political, professional and artistic skills, in conjunction with producing and publishing "Atlas SSR" (Atlas of the Slovak Socialist Republic). As a peak scientific and technical work, "Atlas SSR" documents the qualitative development of the Slovak Cartography Enterprise, and the capabilities of its workers. Decipherability of the professional content, positional accuracy, perspecuity, reconciliation of the professional content and of the base map in each chapter and in the entire atlas mutually--all this requires the cartographer's irreplacable systematic work. The six chapters published so far out of a total of 15 (the atlas as a whole will be published in 1980) are proof that the atlas meets high international standards not only in terms of content, but also cartographically and from the viewpoint of printing.

The outstanding quality of the cartographic products, and the renewal of the assortment are opening up foreign markets. Progress in this direction, however, is partially hampered by a shortage of a suitable forming material for three-dimensional maps and globes. Further development and qualitative improvement of Slovak cartographic production are enhanced also by modernization of the stock of equipment and the use of automation, particularly in cartography and printing, as well as by the high-quality services provided by the statewide Sectoral Information Center for Cartography, newly established at the Slovak Cartography National Enterprise.

4. Tasks Specifically Requested by Various Branches

On the request of socialist organizations, the geodetic and cartographic branch supplies significant works related to the development of our national economy. Requests to provide maps for planning purposes, and special geodetic work for capital construction and the documentation of the projects once they are completed, as well as work for agriculture and other branches, are increasing year by year. In 1979, such requests exceed 20 percent of the present capacity of our branch. Here again the situation is hampered by the unsatisfactory map collections in certain regions of Slovakia.

Preference is given to implementing the resolutions of party and government organs regarding development in the fuel and power industry, the construction industry, in planning and building large hydraulic engineering structures, and in the construction of the expressway network; also to the needs of regional and territorial planning, to producing municipal engineering maps, and to preparing base maps of industrial plants, etc. In recent years, for example, the organizations of our branch prepared base maps of plants, for the East Slovakia Iron and Steel Works, Kosice, for Slovnaft, Bratislava, for Hemko in Humenne, and for several other enterprises. Geodetic work is being provided at present for the construction of a nuclear power plant, of relay stations and of gas pipelines, and also deformation of various structures is being monitored.

By supplying geodetic data and maps for geological exploration and the mining of minerals, as well as by preparing mine-survey documentation and by publishing geological maps, we are actively influencing the development of these important branches of the national economy. Slovak cartography has appeared also on the international forum, by participating in the production of the tectonic map of the Carpathian, Balkan and Dinaric region, on the scale of 1:500,000.

Maps on the scale of 1:500,000 and 1:200,000 were produced, and also other assistance was provided in preparing the graphic supplements to the maps, for the project of Slovakia's urbanization. Maps of the municipal-planning districts and localities are being prepared, for the 1980 census of the population, houses and apartments. In accordance with the specifications of the Slovak Ministry of Development and Technology, a 1:10,000 base map is being prepared of the entire territory of the Slovak Socialist Republic, with special attention to the region of the High Tatra and the Small Carpathian mountains, and certain localities of Central and East Slovakia krajs. The engineering map of the city of Bratislava is nearing completion, the engineering map of Presov is partially ready, and there are demands for similar maps of Kosice, Zilina, and Banska Bystrica.

During the past 20 years, about four million atlases and other cartographic works were published for the needs of school instruction. Furthermore, about 70 kinds of three-dimensional maps and study aids, differing in their subject matter and format, were produced for the domestic market and export, in a combined total run of more than 300,000 castings.

Cartographic products find wide application not only within the organs of state administration and various branches of the national economy, but also in the area of propaganda and political education. Publication of "SNP na Mapach" (The Slovak National Uprising on Maps), also the three-dimensional map of Slovakia illustrating the Slovak National Uprising, or the three-dimensional map of the Czechoslovak Socialist Republic illustrating the advance of the liberating Soviet Army, as well as the entire edition of political-educational cartographic works in the form of posters that inform the wide public about the political division of the world, and about

the economic conditions and development in the individual countries, are certainly contributing to a considerable extent toward intensifying the political and also cultural life of wide population masses.

An important part of the work performed by the organizations within our branch was for the benefit of agriculture, primarily in the process of transition to higher forms of farming, in accord with the introduction of the economy's planned management and the building os socialism in our country. This was work to integrate the holdings of the cooperative farms, which was done within the framework of the economic and technical rearrangement of parcels. Subsequent work was related to improving the stock of farmland and involved the preparation of maps for the planning of soil-improvement, irrigation, drainage and terrain-modification projects.

Land records are indispensable to the development and management of farm production. The branch maintains such records pursuant to the Law on Real-Estate Records, and each year it prepares appropriate summaries for the managing party and economic organs.

In the spirit of the Law on Geodesy and Cartography, the organizations of our branch are cooperating constantly with the national committees at every level, particularly by providing planimetric and topographic maps that are necessary for the realization of multi-dwelling housing construction and for providing civic amenities in the settlements. The organizations of our branch prepare cadastral maps for the purpose of clarifying the ownership and user rights to land, and they also issue excerpts from the real-estate records. Socialist organizations and the population ordered 100,000 cadastral maps under the Fifth Five-Year Plan, and the trend of such orders is constantly rising.

The few mentioned examples of the successful activity of our branch in serving entire socialist society illustrate the broad and diverse range of our economic organizations' production activity. To this we may add the no-less-significant activity of the organs of state administration in the krajs and okreses. Their contributions are primarily the conscientious supervision of geodetic and cartographic work in organizations authorized to do such work, coordination in the interest of incorporating and using geodetic and cartographic works in state maps, and documentation of the results of geodetic and cartographic work performed within their jurisdiction. noteworthy results are achieved primarily in the function of state supervision and control of fulfilling the orders of state central agencies, and direct proof of this is the significant improvement in the quality of the work performed by the enterprises within our branch, and by the geodetic units of other branches. Control and coordination are exercised also at 114 organizations outside our branch where geodetic work stations have been established employing 587 professionals.

5. Factors Aiding the Further Development of Geodetic and Cartographic Work

The organizations of our branch are fulfilling the increasingly demanding tasks of the economic plan, thanks to the application of modern equipment and technology, mechanization and automation. The principle of systematic innovation, of continuously perfecting the organization of production, work and management, is being introduced into specific managerial work. Plan-conforming realization of the tasks of complex socialist rationalization, for example, saved 17.3 million korunas in the entire branch during the Fifth Five-Year Plan, and the actual savings during the first two years of the Sixth Five-Year Plan amounted to 11.9 million korunas. Short-term rationalization measures are oriented primarily on improving internal administrative activity and reducing the number of administrative workers; and in the production sphere, on eliminating the backlog of geodetic work, on making the technological processes more effective, and on utilizing manpower and production capacity more efficiently. Long-term rationalization measures are aimed at improving the lag and fulfillment of the five-year plans; these measures are of branchwide importance or involve exceptionally demanding intersectoral commitments, or possibly require internation cooperation. They concern, for example, the more efficient planning of investments in conjunction with automating geodetic and cartographic work, thoroughly utilizing the technical parameters of the photogrammetric and polygraphic instruments and equipment, etc. The long-term rationalization program, elaborated into individual drives and technical-organizational measures, are a decisive factor in fulfilling the demanding tasks of the annual plans and provide a good foundation for fulfilling the tasks in the coming period. The program of complex socialist rationalization will be perfected further, in the planning phase as well as in the realization stage, and at the same time the obligatory performance norms within our branch will be utilized effectively.

Performance norms must become also a means for perfecting intra-enterprise management within the economic organizations. They must be used effectively in the intra-enterprise planning process, as an instrument for properly measuring performance, and hence also as an instrument for just remuneration.

The Research Institute of Geodesy and Cartography (VUGK), established in 1970, has played an important role in the development of Slovak geodesy and cartography. As the principal scientific-research work station within the branch, it has solved up to now more than 70 tasks of the plan for the development of science and technology. Many of these tasks were of branchwide importance, involving research, planning, technology or realization. Two tasks of the state plan not included in the programs, namely "Research of Recent Movements of the Earth's Crust" and "Research of the Technology of Establishing Geodetic Nets, From the Aspects of Optimality Criteria," have already had a noteworthy impact, through their partial results, on scientific work stations concerned with basic, theoretical geodesy, and they have found also practical application, for example, in the construction of the large dams on the Danube.

Most solved tasks of applied research are realized within the organizations of the branch, and their substantial contribution is evident in the quantity and quality of the work performed. In this area, however, it is necessary to devote closer attention to the questions of calculatting the economic contributions of the realized research tasks, of the utilized innovation proposals, and of new technology in general. The branchwide performance norms must provide effective help also in this area.

The innovation movement that is developing in an organized manner effectively aids the solution of minor urgent problems at the work stations. A total of 565 innovation proposals were submitted during the ten-year existence of the SUGK. Within this total, the 314 proposals that were realized contributed about three million korunas to society. The program planned under the Sixth Five-Year Plan for the development of the inventor and innovator movement is being overfulfilled each year, in terms of the number of inventions and innovation proposals, as well as in terms of the total contribution to society. A proven method of developing the innovation movement is to designate May of each year as the month of inventors and innovators, which helps to activize the innovators.

The VUGK successfully performs also other activities that are of branchwide and statewide importance. For example, it develops the system of scientific and technical information within the statewide Sectoral Information Center for Geodesy, and it functions as the branch center for the education of workers. More recently, it has also become a center for postgraduate study. Particularly this last activity leaves the question of the institute's competence open, because it is necessary to ensure the realization of the branch concept for the education of scientific workers. This concept is fairly demanding in terms of the number of scientific workers who must be trained for the central agency and its organizations.

In agreement with the concept of developing geodesy and cartography in the Slovak Socialist Republic, the VUGK is solving tasks of the plan for the development of science and technology, on the basis of its specialization agreement with the Research Institute of Geodesy, Topography and Cartography, Prague, and the No 090 Research Center, Prague. It concentrates particularly on the problems of perfecting the methods of planning and managing geodetic and cartographic work, on the mechanization and automation of geodetic work in conjunction with the realization of the ISGK [Geodetic and Cartographic Information Center], on the production of maps for the national economy, on research to optimize determination of the coordinates and elevations of points on the earth's surface, and on comprehensively utilizing satellite photographs for cartographic purposes. The mentioned orientation of research unquestionably contributes not only toward improving, but also toward speeding up and increasing the capacities of the production organizations.

The persisting conflict between the growing demand for geodetic and cartographic work on the one hand, and the inadequate production capacities of

the branch's organization on the other, demands that we preferentially orient research and production toward the intensive application of mechanization, and particularly toward the automation of field and office work in geodesy and cartography. These directions are defined very specifically in the branch concept of automation in 1979-1985, and also in the concept of introducing micrography within the SUGK. Realization of these documents requires the planned training of cadres and the acquisition of automation equipment, in accordance with the approved technical-organizational measures. This will involve expansion of the computer center at the Institute of Geodesy, and of the automation centers at all enterprises within the branch. Their full inclusion in the production process will substantially raise labor productivity.

The professional and organizational level of our geodesy and cartography can best be evaluated by comparing it with the level abroad. In the course of exchanging experience in this field, which is realized on the basis of bilateral scientific-technical cooperation agreements with the geodetic services of the socialist countries, and also during the joint solution of tasks, our experts are not only equal partners but even rank first in certain activities. Through the integration of the scientific and research capacities of the socialist countries' geodetic services, tasks are solved that interest all or most services. Active participation of our specialists is developing within the framework of permanent international nongovernmental organizations as well as within the organs of the United Nations.

An example of international assistance is also the sending of specialists to Cuba as consultants and educators, in conjunction with establishing the Cuban land register and developing cartographic production there. But it is regrettable that the persisting shortage of specialists for the fulfillment of tasks at home does not permit meeting the constant demand to export geodetic and cartographic work, particularly as aid to developing countries.

There has been ample evidence during the past 25 years that the results which the branch achieved can be credited also to the development of the workers' initiative and to properly employed socialist competition. Valuable are the workers' pledges to accept stepped-up plans, to shorten the production time, to improve the quality of the work performed, to save material, to reduce production costs, to sponsor students, to provide political and professional assistance for socialization, etc. The drive to form brigades of socialist labor and complex rationalization brigades has become the core of the expansion of socialist competition. The number of such brigades is increasing year by year. Within the branch, 139 brigades of socialist labor were competing in 1978, and the collectives of 97 of them were awarded the honorary title of brigade of socialist labor. In the collectives there are 1155 members who wear first-class badges, and 129 who have been awarded second-class badges. The number of complex rationalization brigades functioning successfully in 1978 was 17.

An effective form of upgrading the development of the workers' initiative is the annually held branchwide aktiv attended by the top officials of the

organizations, party, trade-union and youth-organization officials, and the best workers of the organizations. Various drives are developing successfully to upgrade the quality of geodetic and cartographic work. An example of this is the Geodesy National Enterprise, Presov. In 1978, this enterprise hosted the branchwide aktiv of the brigades of socialist labor, aimed at improving the quality of all work.

The joint socialist pledges made by the branch's organizations in the krajs and okreses, and by kraj and okres state organs, have a favorable influence on managerial and organizing work. The substantial results of the total of 55 joint pledges are reflected favorably in the long-range planning of the map collection's renewal, and in the area of real-estate records and services for the population.

Intensification of the development of the workers' initiative directly influences fulfillment of the economic tasks of the branch. Enterprise, branch and state decorations are awarded to the workers who are successful in socialist competition and in fulfillment of their tasks. They receive also other forms of material and moral appreciation.

Development of the workers' initiative remains permanently an abundant source of a rise in labor productivity, and we will have to constantly devote maximum attention to it.

6. Conclusion

When looking back on the elapsed 25 years of the centralized geodetic and cartographic service in our country, we may note with satisfaction that geodesy and cartography have contributed by their work toward building an advanced socialist society, and that also the branch of geodesy and cartography has helped convert our country into one with developed industry, modern agriculture, and a high cultural level. Today it can be established that favorable conditions have been created for the further development of geodesy and cartography, for the fulfillment of their responsible tasks to promote the development of our national economy.

The trends in the further development of our geodesy and cartography will be the systematic perfection of management with special attention to upgrading particularly intra-enterprise management, the further perfection of the process of planning, and of financial and wage policy, and also the analysis of the results of all activity and their adaptation to the long-range and more-demanding conditions of development. The expansion of production and its greater efficiency will be achieved through the systematic application of automation, the uncovering of reserves, the efficient use of fixed capital, particularly of new equipment acquired through import. At the same time emphasis will be on reducing the demand for foreign exchange.

Proper orientation of research activity, rapid practical application of research results, systematic upgrading of the workers' qualifications, and

suitable guidance of the development of the workers' initiative, and of their efforts to implement the principles issued for comprehensively managing the quality of all work, will certainly be decisive factors in meeting the constantly growing demand for geodetic and cartographic work, not only during the last two years of the Sixth Five-Year Plan but also in the future.

The basic strategy of our economic policy is to improve the efficiency and quality of all work, and to utilize all the intensive growth factors.

In this conviction, on the 25th anniversary of the formation of our branch, we wish to express our appreciation to all conscientious workers of the geodetic and cartographic branch for their work to date, which we highly value.

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TESTING THE EC 1025 COMPUTER IN THE DOS 3 EC OPERATING SYSTEM

Prague AUTOMATIZACE in Czech No 3, 1979 pp 67-68

[Article by Engr Josef Klouda: "International Tests of the Czechoslovak EC 1025 Computer and DOS 3 EC Operating System Within the Unified System of Electronic Computers"]

[Text] After the Czechoslovak Socialist Republic joined in 1969 the socialist countries' international cooperation in computer engineering, a purposeful and plan-conforming expansion began in the research, development and production of computers and peripherals. During the past ten years, workers in the field of computer engineering could boast of many noteworthy results. One of their most important achievements in the first half of the 1970's was was the EC 1021 computer system that became the main vehicle of computer technology's introduction in the Czechoslovak economy. Tens of such systems are now in operation throughout entire Czechoslovakia.

When it was decided within the framework of the socialist countries' international cooperation to build a new series of 3.5-th generation computers, the Czechoslovak Socialist Republic was assigned the principal task of researching, developing and producing the EC 1025 computer.

The type of computer and its required parameters were decided on the basis of the specific conditions of the Czechoslovak enterprise sphere's structure. Computer systems for automated management systems and for the computer service enterprises account for the bulk of the statewide demand for computers; therefore the functional characteristics of the computer must conform to automatic data processing at the enterprise level, and partially also to the requirements of the supra-enterprise integrations.

Likewise important is the future feasibility of realizing remote data processing with the help of terminal systems, and of the computer's integration as a subordinate system into higher-level computer networks.

After an analysis of these aspects, it was decided to develop a universal computer with capacities and performance parameters in the lower range of the JSEP [Unified System of Electronic Computers] Series 2, and at the same

time to design a set of peripherals in a composition such that will permit building a major portion of the designed system's basic configuration. This design simultaneously took into account also the long-standing traditions of computer engineering's development in Czechoslovakia, oriented from the very beginning on the research, development and production of mini and intermediate computers such as, for example, computers of the EPOS, MSP and ZPA 600 series, and the EC 1021 computer. This procedure and scope of design were in accord also with the capabilities of the Czechoslovak research, development and production base and were consistently geared to close international cooperation with the socialist countries participating in the JSEP Series 2 program.

The EC 1025 computer, and the DOS 3/EC disc-oriented operating system, intended for mini and intermediate computers of the JSEP Series 2, underwent successful international tests from 28 November through 7 December 1978, at the Research Institute of Mathematical Machines (VUMS), Prague.

An international commission headed by Comrade G. Smirnov (deputy director of the NIIEVM, Scientific-Research Institute of Electronic Computers, Minsk) conducted the international tests of the computer. The members of the commission were delegates from Bulgaria, Hungary, East Germany, the Soviet Union, Czechoslovakia, and from the Coordination Center of the Intergovernmental Commission for Computer Engineering, Moscow.

THE EC 1025 computer was tested in the following configuration:

The EC 2025 processor with an immediate-access memory of 256 kilobytes, equipped with an operator's control panel and CRT display, with an EC 0101 keyboard, an EC 7934 matrix serial printer, and two EC 5074 floppy-disc units;

Two magnetic-disc memories with a capacity of 2 x 100 megabytes;

Four EC 5004 magnetic-tape memories (120 kilobytes/sec);

Two EC 6016 controller-equipped card readers (1000 cards/minute);

Two EC 7014 controller-equipped card punches (120 characters/sec);

Two EC 7034 controller-equipped line printers (1000 lines/minute);

Two EC 9080 card reader-punches.

The tests demonstrated that the Czechoslovak EC 1025 computer was fully equipped to operate in the virtual adressing mode with a virtual address space of up to 16 megabytes. The modular design of the processor, which consists of six independent processors and immediate-access-memory blocks, is a significant step toward the architecture of newer-generation computers. Likewise the modern design of the operator's control panel, with

CRT display, was rated highly from the viewpoint of facilitating man-machine interaction. It was confirmed that the computer attains the required performance of its processor (in a test using the Gibson I mix, the processor's performance was 33,200 operations/sec). Because the test results were successful, EC 1025 computer was recommended for series production, and for use within the Unified System of Electronic Computers.

The international tests of the DOS 3/EC operating system were conducted by a commission whose chairman was Professor M. Shur-Bura, DrSc (Academy of Sciences USSR). The members of the commission were delegates from Bulgaria, Hungary, East Germany, the Soviet Union, Czechoslovakia, and from the Coordination Center. The DOS 3/EC operating system, developed in Czechoslovakia in cooperation with Hungary, was submitted for the tests. The commission established that this was a multiprogramming system of modern design, one that ensured effective contact with the input/output devices and incorporated testing, service and diagnostic functions. Operation with a library is ensured. Compilers from Assembler, Fortran IV, Cobol, PL/I, Pascal, Simscript, and RPG II with Autoreport languages also were tested. In addition to the problems to test operation with the hardware of the EC 1025 computer, the functions of DOS 3/EC were tested also on 140 examples prepared at the Research Institute of Mathematical Machines, and on 20 additional examples that the individual delegations specified at the commencement of the tests. The commission rated the DOS 3/EC as the JSEP's first operating system submitted for international testing, one that ensured effective operation with a 16-megabyte virtual memory for each user and serviced an external memory with a bus capacity of 100 megabytes. Compatibility with the earlier DOS 1 and DOS 2 operating systems was rated highly. The documentation for program maintenance and the user's manuals were reviewed, and it was found that they fully met the specifications. Use of the DOS 3/EC system for JSEP Series 2 computers was approved.

The two commissions established that the EC 1025 computer and the DOS 3/EC operating system comprised a well-balanced unit whose concept conformed to the present world level, and that is was a valuable Czechoslovak contribution to the Unified System of Electronic Computers.

After the successful completion of the tests, it is in the interest of the Czechoslovak national economy to supply the developed computer to their users as soon as possible. Thanks to fulfillment of the "Joint Socialist Pledge of the Workers of the Research Institute of Mathematical Machines, and of the Industrial Automation Plants, Cakovice," the research-development-production-use cycle has been shortened and, in addition to the tested prototype, two more EC 1025 computers were built by the end of 1978, as the foundation for series production in the coming years.

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ARITMA BEGINS PRODUCTION OF EC 5075 FLOPPY-DISC UNIT

Prague AUTOMATIZACE in Czech No 3, 1979 p 69

[Article by Engr Jan Libensky: "Floppy Discs From Aritma"]

[Text] In 1979, the Aritma National Enterprise has begun production of the Aritma EC 5075 floppy-disk input/output unit intended for 3.5-th generation computers, respectively for the JSEP [Unified System of Electronic Computers] Series 2 computers, to directly enter data in the computer and conversely, to record data on discs. The Aritma EC 5075 unit can be connected to a standard multiplexer, selector or block multiplexer channel. In comparison with the traditional punched-card peripherals, the Aritma EC 5075 floppy-disc input/output unit permits substantially faster input and output of computer data and is less demanding in terms of equipment size and data carriers.

The floppy disc itself is a thin magnetic disc 200 mm in diameter, placed in a plastic holder 203 by 203 by 1 mm in size. The disc weighs 40 grams and has the same recording capacity as a box of 2000 punched cards weighing about 6 kg. Information is recorded on the disc in series on 77 circular tracks, each track divided into 26 sectors. The capacity of a track is 3328 bytes. The capacity of the entire disc, with two reserve tracks left empty, is 242,944 bytes; each block has 128 blocks reserved for data. A read/write head performs the reading and recording by the contact method.

The base of the EC 5075 unit measures 1160 by 695 mm, and it is 940 mm high. It contains one or two EC 5074 automatic floppy-disc changers. With one changer, the unit weight 180 kg; with two changers, its weight is 205 kg. The automatic floppy-disc changer permits the changing of up to 20 floppy discs in the magazine, without the operator's intervention, merely on computer command. Upon the completion of recording or reading, the floppy disc is released from the recording unit and filed in the file part of the magazine, after which the next floppy disc is automatically fed. The feed/file cycle takes about 5 seconds. The floppy discs are fed only in the same sequence as the one in which they were placed in the magazine. If the Aritma EC 5075 floppy-disc input/output unit is equipped with two EC 5074 automatic floppy-disc changers, the two may operate independently

of each other; for example, one may read while the other records, both may read, etc. The control unit of the EC 5075 processes computer instructions and controls data transmission in the channel as well as both floppy-disc changers. It also permits communication with the operator's panels and with the engineer's panel. The microprogram controller has its control program stored in a read-only memory with a capacity of 1536 addresses and a word length of 18 bits. The channel part ensures communication between the external registers and the standard channel interface. The control panel permits autonomous shifting of the floppy disc from the magazine into the memory and conversely, and it also displays the numbers of the possible errors. The engineer's panel permits monitoring of the equipment in autonomous operation.

Each EC 5074 recording unit transmits the read data at a rate of 3600 sectors/minute. In comparison with the EC 6016 card reader (it reads 1000 cards per minute), reading from floppy discs is 3.6 times faster; if both units are used for reading, the reading rate is 7.2 times faster. The recording rate is 2200 sectors/minute on each EC 5074 unit; in comparison with the EC 7014 card punch (it punches 3500 to 7000 cards per hour), each EC 5074 unit is 19 to 38 times faster. At the same time, a punched card contains 80 or at most 90 characters, while a floppy-disc sector may have up to 128 bytes.

In accordance with the requirements of the Unified System of Elctronic Computers, the technical specifications guarantee on average at least 500 hours of trouble-free operation for the EC 5075 unit. The Aritma EC 5075 floppy-disc input/output unit is able to operate continuously within a temperature range of 5 to 40°C and a relative humidity range from 40 to 95 percent. The recommended operating conditions are as follows: ambient air temperature, 25 ± 10°C; relative humidity (at 30°C), 65 ± 15 percent; atmospheric pressure, 84 to 107 kPa. Maximum permissible dust content of the environment is 1 mg/m^3, and the maximum permissible size of the dust particles is 3 microns. The unit's required power input is 0.8 kVA at 220 V + + 10 percent to - 15 percent. The capacity of the feed and file magazine is 20 floppy discs for each changer. The discs rotate at a speed of 360 revolutions per minute.

THE EC 5075 unit successfully underwent international tests in December 1978 and has been included in the nomenclature of the Unified System of Electronic Computers. The professional public first became acquainted with the unit at the 20th Jubilee International Engineering Fair in Brno, in the autumn of 1978, when the unit was entered in the competition for the gold medal. Because the modern component base of the 3.5-th generation JSEP computers uses high-speed semiconductor memories of the PROM type and high-speed medium-scale-integration circuits, high operational reliability is ensured. Therefore it is assumed that the EC 5075 floppy-disc input/output unit will not only be connected to the 3.5-th generation EC 1025 computers, but that also other CEMA countries will show an interest in this unit. The proposed price should not exceed 400,000 korunas. The manufacturer provides an extended 12-month warranty.

The modern high-speed computer input/output unit of nonconventional design, using floppy discs, is a further significant contribution by the Aritma National Enterprise to the Unified System of Electronic Computers produced by the CEMA countries. This is already the tenth peripheral that the Aritma National Enterprise has developed for the Unified System of Electronic Computers, and most of these peripherals are being produced in large series and successfully exported.

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POLAND

INDUSTRIAL ROBOTS DEVELOPED BY WARSAW INSTITUTE DESCRIBED

Prague STROJIRENSKA VYROBA in Czech No 3, 1979 pp 212-218

[Article by Eng Henryk Andrzejewski, M. A., Institute of Precision Mechanics, Warsaw: "Industrial Robots Developed by the Institute of Precision Mechanics"]

[Text] The Institute of Precision Mechanics in Warsaw began work related to the development, design, production and application of industrial robots in 1976. Since then it has produced the RIMP-401 series of simple robots and the RIMP-1000 first-generation robot.

The RIMP-401 Robot

The RIMP-401 industrial robot is an automatic program-controlled manipulator designed to replace operations by humans such as transfer, feed and removal of workpieces in the production process. Its handling capabilities enable it to be effectively used in connection with:

--trimming, bending and drawing presses for metal products;
--presses for plastics;
--machine tools;
--production lines and sections;
--pressure casting equipment;
--induction hardening equipment;
--drop forges;
--equipment for interoperation transport and the like.

The RIMP-401 industrial robot consists of a frame, a rotary column and one or two horizontal arms with jaws at the ends, and a control box which is either incorporated into the frame or free-standing.

The robot has 4 degrees of freedom:

--rotation of the colums and the arm(s) around the vertical axis;
--extension of the arms;
--raising of the colums and the arms;
--rotation of the jaws around the axis of the arms.

In addition to these basic movements, the jaws can be closed.

The jaws can be replaced by suction or electromagnetic holders.

The robot has pneumatic and hydraulic drive for raising and rotating the arms and pneumatic drive for the other movements.

The robot's control system allows programming and then automatic performance of the basic movements in coordination with external equipment (either processing or auxiliary equipment).

The control block consists of the following functional assemblies: the timing, receiver, operating and relay units. These units are designed as independent modules. The control elements are in separate design blocks (programming plugboards) or in control consoles (main and auxiliary). The auxiliary console has pushbuttons for manual control of the main movements of the robot and the auxiliary equipment.

Remote control is possible through a movable console.

The RIMP-401 robot is a two-position design. The extreme positions of the main movements are governed by the positions of mechanical stops.

The duration of the basic clock pulse is 100 msec, but it may be increased to as much as 400 msec.

The maximum program length is 36 steps, each of which may consist of a specified number of basic movements of the robot (up to 5) and the auxiliary equipment (up to 6).

Main Technical Data for the RIMP-401 Robot

Maximum extension of arm(s)	400	600
Number of degrees of freedom	3 or 4 (plus jaw movement)	
Number of arms	1 or 2	
Range of working movements:		
rotation of arms (deg)	0-120	
raising of arms (mm)	10-150	
Load capacity at maximum arm extension (kg):		
with one arm	4	4
with two arms	2 x 2.5	2 x 1.5
Maximum working range (mm)	1200	1600
Rotation of jaws about axis of arm (deg)	90-180	
Duration of working movements at maximum range (sec):		
rotation of arms	1	1
raising of arms	0.5	0.5
lowering of arms	0.6	0.6
extension of arms	0.8	1.0

retraction of arms	0.9	1.2
rotation of jaws	0.3	0.3
closing of jaws	0.2	0.2
opening of jaws	0.3	0.3
Position accuracy (mm)	±0.3	
Programming system	Plugboard, 30 x 50 positions	
Control system	Two-position	
External signals:		
number of inputs	9	
number of outputs	7	
Power supply:		
voltage (V)	220	
frequency (Hz)	50	
Compressed air (MPa)	0.5 ±0.05	
Weight (kg):		
robot with one arm	475	480
robot with two arms	500	510
Dimensions (mm):		
depth	1767	1967
width	1030	1030
height	1069	1069

The simple RIMP-401 robots have already found a good many uses, for example in servicing machinery for induction hardening (Fig. 1) and in production sections for forming (Fig. 2).

Fig. 1. RIMP-401 Industrial Robot Used with Equipment for Induction Hardening of Shafts.

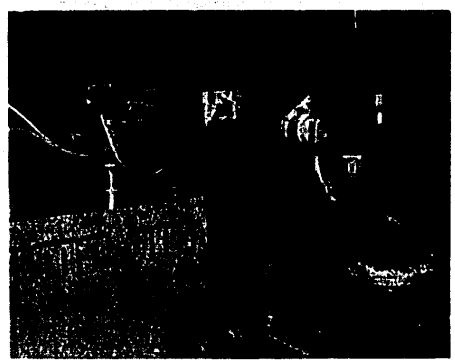

Fig. 2. RIMP-401 Industrial Robot Used in Metal Forming

The RIMP-1000 Robot

The RIMP-1000 robot is a first-generation robot with a memory with works in the polar coordinate system. It is designed to carry out automatically the functions of the human upper extremities, particularly in such work as:

--welding and heat cutting;
--loading and unloading of transport equipment;
--pressure casting;
--painting and application of protective coatings;
--interoperation transport;
--simple assembly work.

The RIMP-1000 robot can replace humans in extremely difficult working conditions such as large temperature fluctuations, dusty of toxic atmospheres, or high- or low-frequency vibrations.

The design of the robot consists of two basic parts:

a. the functional mechanism,
b. the control box.

The functional mechanism consists of a frame with a rotary column and a telescoping arm to which is attached a tool head. Kinematically, the robot may have from 3 to 6 degrees of freedom, as specified when it is ordered.

The rotary column and arm provide three basic movements of the tool head, while the head itself has (depending on the design) two or three degrees of freedom.

The individual parts of the robot which move the tool in the working area are moved by straight-line hydraulic motors. The motors are controlled by servo-valves, making it possible to perform the motions at different speeds and to fix the tool in any preselected position.

The hydraulic fluid is fed to the hydraulic motors by a hydraulic generator located either in the body of the robot or externally to it.

The hydraulic generator, the servo-valves and the memory system are controlled from the control board, which is connteced to the robot by a multi-conductor cable. This makes it possible to locate the control box at some distance from the operating mechanism, so as to eliminate unfavorable effects on the electronic system resulting from rotation.

The electronic system is controlled from a control console on the control box. Manual control is used while training the robot; the connection to the control box is by a long cable. This enables the operator who is training the robot to be located at the place where the tool attached to the tool head is in operation, and to monitor its operation visually.

The control system for the robot has an additional output to make possible coordination of its movement with auxiliary equipment such as an assembly line, a welding unit and the like.

Tool movements are summarized in Fig. 3. The straight-line movements of the tool performed by individual design components are:

--movement of the tool head by extension or retraction of the arm;
--raising of the tool head by inclining the arm;
--movement in the horizontal plane by rotating the column and arm.

The other three movements are:

--rotation of the tool head around the horizontal axis;
--rotation of the tool head around the axis of the arm;
--rotation of the tool head around the vertical axis.

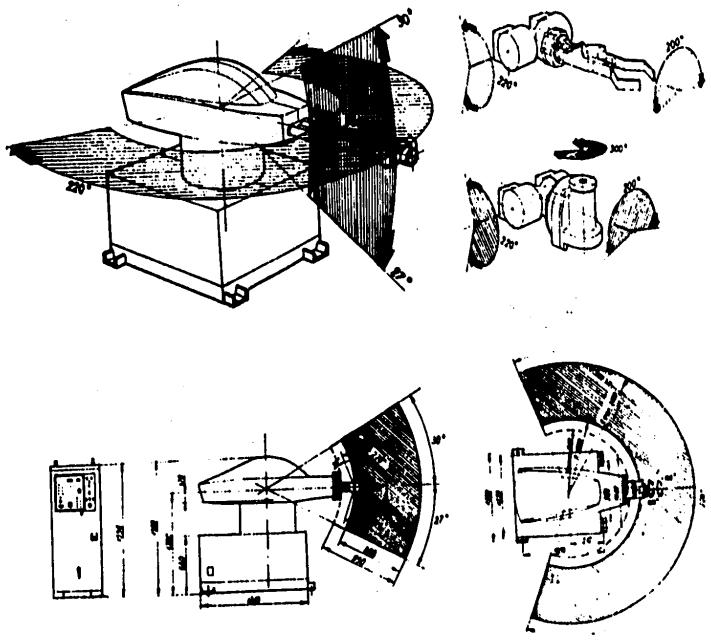

Fig. 3. Range of Movements of the RIMP-1000 Industrial Robot.

Basic Technical Data for the RIMP-1000 Robot

Number of degrees of freedom	6
Range of working movements:	
extension of arm (mm)	900
rotation of arm (deg)	±110
raising of arm (deg)	±30
rotation of tool head about horizontal axis (deg)	±110
rotation of tool head about axis of arm (deg)	±100
rotation of tool head about vertical axis (deg)	±150
Drive (all movements)	Hydraulic
Movement of jaws or other tool mechanism	Pneumatic
Maximum load (kg)	60
Maximum torsional stress for tool head (N-m):	
rotation around horizontal axis	100
rotation around axis of arm	60
rotation around vertical axis	80
Coordinates of working movements	Polar
Accuracy of positioning (mm)	±1.5
Method of programming	Teaching
Control system	Point to point
Power supply:	
voltage (V)	3 x 380
frequency (Hz)	50
Nominal hydraulic pressure (MPa)	6.3
Compressed air pressure (MPa)	0.3-0.7
Weight of robot (kg)	1100
Weight of control box (kg)	500

The RIMP-1000 industrial robot has been used for welding in the production of special motor vehicles (Fig. 4).

Fig. 4. Use of Industrial Robot in Welding of Parts of Special Motor Vehicle.

Further Developments

The scientific and production work of the Institute of Precision Mechanics dealing with industrial robots is currently proceeding in two main directions:

--production of designs for robots and auxiliary equipment;
--utilization of robots in manufacturing processes.

A prototype robot based on the RIMP-401 robot, with a load capacity of 15 kg and specially reinforced arms has been developed. In addition, special robots for specific operations and work with different kinds of equipment, for example presses for plastics, are being developed. These robots will be characterized by their small number of degrees of freedom (3), simplified design, and low production and operating costs.

Another direction of development is the design of a modular system of robots in which various types of robots with their own drive and control units can be installed.

Three different varieties of robots will be developed for various uses: stationary, mobile and suspended; these will be used primarily in welding, painting and interoperational transportation.

The auxiliary equipment will develop in the direction of expanded technical capabilities for lines or manufacturing sections through the development of new types of feeders, spacers and transporters which orient the semiproducts relative to the robot or machine.

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